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MAY, 1929

ENTOMOLOGICAL NEWS

Vol. XL No. 5

EZRA TOWNSEND CRESSON
1838-1926

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1
Act of October 3, 1917, authorized January 15, 1921.

ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Ernest Baylis, Associate Editors; John C. Lutz, Business Manager.

Advisory Committee: Philip Laurent, J. A. G Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr.

The subscription price per year of ten (10) numbers is as follows:

United States and possessions . .	$3.00
Canada, Central and South America .	3.15
Foreign	3.25

Single copies 35 cents. Sample copies 50 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 8.00
Ten issues " 11.00, " 20.00, " 35.00, " 70.00

SUBSCRIPTIONS. All remittances and communications regarding subscriptions, non-receipt of the NEWS or of reprints, and requests for sample copies, should be addressed to

JOHN C. LUTZ, 6623 Lansdowne Ave., PHILADELPHIA, PA.

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Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

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PROVINCIAL MUSEUM, VICTORIA, B.C., CAN.

E. H. BLACKMORE

ENTOMOLOGICAL NEWS

VOL. XL. MAY, 1929 No. 5

North American Institutions Featuring Lepidoptera.

IV. The Provincial Museum, Victoria, B. C., Canada.

By J. D. GUNDER, Pasadena, California.

(Plate VI.)

The Provincial Museum of Natural History at Victoria, British Columbia, Canada, was founded by the Provincial Government on October 25, 1886. Its first public displays occupied simple quarters in the old Supreme Court Building, but as the Institution developed under the leadership of John Fannin, ornithologist, it was thought necessary in 1897 to move it to its present home (shown to left in illustration as marked) in the two-story, east wing of the Parliament Block. These buildings, which are of solid stone construction, always look impressive to visitors and have that substantial, well built appearance so characteristic of Canadian Government structures. The present director, Mr. Francis Kermode, has been in charge of the museum since 1904, his special interests being, mammalogy and ornithology. A white bear *Ursus kermodei* Horn. is named in his honor. The local government should appropriate additional funds for expansion and reorganization, so that this deserving institution can be kept more up to date and abreast with the times.

There are two large, plate glass exhibition cases of nicely arranged and mounted lepidoptera representing local material on view to the public; one of butterflies and the other of moths. The study collection of insects amounts to about twenty glass-top drawers. The museum has no types of lepidoptera. Mr. W. H. Danby and Mr. C. DeB. Green, both collectors of lepidoptera, founded the collections in 1892.

A second complete "Check List of Macrolepidoptera of British Columbia" was recently (1927) issued by the Museum. This very helpful publication, which is being kept up to date

in the Annual Reports, was edited by Mr. E. H. Blackmore, who acts as honorary curator for the entomological division. He is shown in the illustration standing by one of the museum's cases of insects. Mr. Blackmore has been interested in lepidoptera for about thirty-five years and has recently been devoting his entire spare time to the study of local microlepidoptera. For several terms (1916-17; 1919-20), he was president of the British Columbia Entomological Society. He was born on January 20, 1878, in Ludlow, Shropshire, England, and has two sons. Mr. Blackmore is credited to date with about fifteen entomological papers, the first appearing in the *Proceedings* of the local Society in March, 1916. Several have been published in the *Canadian Entomologist*. His personal collections and types are kept at home. He has been an official in the Government Postal Service for many years and is well thought of in Victoria.*

British Columbia has always listed a good quota of active entomologists. In 1901 Messrs. R. V. Harvey, G. W. Taylor and Tom Wilson founded the B. C. Entomological Society and this organization has published annually their "Proceedings" since 1911. Prior to that, from March, 1906, to June, 1908, there was issued a quarterly Bulletin. The Society meets alternately in Victoria and Vancouver.

A List of Macrolepidoptera of Pennsylvania.

I am compiling a list of macrolepidoptera of Pennsylvania and would like to obtain as many records as possible, giving dates, localities and any other notes of interest. Even notes on one or two species will help to make the article more complete. If you have many species to record, I can send a tentative list to which can be added the data you can furnish. All contributors will receive full credit for their contributions. Address Dr. Harrison M. Tietz, Dept. Zoology, Penn State College, State College, Penna.

*I have just had word from Mrs. F. Blackmore with the sad news that her husband, Mr. E. H. Blackmore, passed away suddenly on March 2, 1929.

Clothes Moth Prevention as Adapted to the Needs of the Housekeeper.

By HELENE WHITE,* B. B. FULTON, and KATHERINE T. CRANOR, Home Economics Division, Iowa State College, Ames, Iowa.

(Continued from page 121)

Experiment 7. To test the value of Eulan A, a moth-proofing solution.

a. Eulan A was prepared for use according to directions furnished by the manufacturer. Twenty cc. of the solution was mixed with 240 cc. of water and 240 cc. of methylated spirits (wood alcohol). Five samples of batiste were saturated with this solution and allowed to dry. Each was then placed in a tin box with one larva. In case the larva died, it was replaced.

b. A sample of batiste was treated with the solution as in "a" and placed in a tin box together with an untreated sample and four larvae.

c. A sample of blanket was treated as in "a" and placed in a tin box with two larvae.

Samples treated with Eulan A were not harmed by the larvae at the end of 11 days. By this time all larvae placed on the materials at the beginning of the experiment were dead. In the case where treated and untreated samples were used, the larvae were still feeding on the untreated samples. This an indication that Eulan A is a satisfactory moth-proofing substance.

Experiment 8. To test the value of sodium silico fluoride (Na_2SiF_6), for moth-proofing use.

a. A saturated solution of sodium silico fluoride was made by boiling a liter of water containing an excess of crystals, 25 grams, for five minutes. (Na_2SiF_6) is said to be 2.46% soluble in boiling water, but is less than 1% soluble at ordinary temperatures.

After the solution had cooled and settled five samples of batiste were saturated and dried. Each was placed in a tin box with one larva. In case the larva died another was substituted.

b. A sample of batiste was treated as in "a" and placed in a tin box with four larvae.

c. A sample of treated batiste was placed in a tin box together with an untreated sample and four larvae.

d. A sample of blanket was treated and placed in a box with two larvae.

At the end of 11 days samples treated with sodium silicofluoride were uninjured. The larvae on the blanket sample were still alive, but not feeding. Those in the boxes containing treated and untreated samples were still alive, either feeding on the untreated material or in cocoons. This indicates that sodium silico fluoride has a decided moth-proofing effect on woolens.

Experiment 9. To test the value of sodium floride (NaF) for moth-proofing use.

a. A saturated solution of sodium floride was made by boiling a liter of water containing an excess of crystals, 45 grams, for five minutes. (NaF is slightly over 4% soluble in boiling water.) After the solution had cooled and settled five samples of batiste were treated by saturating and drying. Each was then placed in a tin box with four larvae.

b. A sample of batiste was treated as in "a" and placed in a tin box together with an untreated sample and four larvae.

Samples treated with sodium fluoride solution were uninjured at the end of 15 days. Where both treated and untreated fabrics were used, the untreated was slightly damaged, but the treatment was unharmed. Apparently sodium fluoride is of value in moth-proofing.

Experiment 10. To find the value as a moth-proofing solution of Enoz Moth Spray.

a. A sample of flannel was saturated with Enoz and allowed to dry. Three larvae were placed on the sample in a tin box.

The larvae died within a week. The material had such an oily feel and the odor was so disagreeable even after two months of airing that the solution was considered impractical for use for moth-proofing and no further experiments were made.

Experiment 11. To find the physical effect of the moth-proofing solutions on various material.

Samples of purple felt, black and white checked wool suiting, red wool broadcloth, blue wool crepe, mohair upholstery material, and white fur were saturated in each of the following solutions: Larvex, Eulan F. Extra, Eulan A., sodium silico fluoride, and sodium fluoride.

Untreated material on which larvae were placed, as checks, at the same time that each group of experiments on moth-proofing was started, was bady damaged.

The results of the various moth-proofing experiments indicate that moth-proofing is of value in protecting textiles from infestation.

The visible physical characteristics of the wool fabrics of various colors and weaves were not changed by any of the five moth-proofing solutions used. The mohair upholstery material should be brushed while still slightly damp to insure the retention of its luster.

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An Orthopterist's Point of View as to the value of Specific and Racial (Subspecific) Names and the Uselessness of those for "Varieties" and "Forms."

By MORGAN HEBARD, Philadelphia, Penna.

In recent somewhat comprehensive studies of certain species of Orthoptera, certain factors, which have received but little consideration or have been wholly overlooked in the past, have become constantly more apparent and their relative values better understood. One of the most vital points is the comprehension of the occasional necessary subdivision of specific units into geographic races. This factor until recent years had been almost wholly overlooked by entomologists and, in the literature, material representing such subspacific differentiation was almost invariably treated as inseparable from typical material of the species, or described as representing a distinct species. The reason for this is easily found; in the past work of almost all authorities on the subject, large series of specimens of one species from many portions of its range have not been obtainable, and from inadequate material the presence of geographic races could not be discerned.

GRADUAL GEOGRAPHIC SPECIFIC VARIATION.

In numerous species a gradual increase in size, or in brilliancy of coloration, or both, is found in their distribution toward the equator. In such species the size increase is general and proportional, while the difference in coloration does not affect the

color pattern. These variations are, we believe, the specific adaptation to the gradual changes of climatic conditions over the range of the species; the naming of the very different appearing extremes of such variation from, say, New Jersey and Florida, must be strongly condemned. With the assumption that names are for the purpose of distinguishing units of varied importance, it is quickly apparent that when in such cases large series of material from the entire range of the species show a gradual and constant gradation from one extreme of development to the other, no definite points for division exist and were the extremes named, intermediate conditions could receive with equal propriety names having not the slightest value.

Geographic Races.

In some species virtually constant differences are found to separate series from one area from those from another area, such areas being almost always very extensive. These differences are found in disproportionate increase in size, length or width of certain portions of the insect, differences in the structure of various parts or in the color pattern; all of these being virtually constant over considerable areas, but in the intervening (usually much more restricted) areas showing every intermediate gradation. Such distinct units in a species are termed geographic races and are properly designated by a trinomial.

In insular and otherwise isolated aggregations of a species, such geographic races also occur, but these are sometimes naturally restricted to very limited areas and intermediate material is usually not to be found.

Undoubtedly some geographic races will eventually become specific units, while others will disappear, and the isolated forms mentioned above indicate the evolution of the species which has occurred since the separation took place.

Local Geographic Variation.

In addition to the above geographic variations, differences are often found in material from distinctive conditions in local environment. These are interesting in the study of a species,

but can not properly bear name designation if they are found to vary without any line of demarkation from the extreme of difference to the typical condition.

Individual Differences.

Differences in species of Orthoptera such as macropterism and brachypterism, various types of coloration (such as melanism, albinism, etc.), intensive and recessive conditions of color pattern, extremes of ovipositor length and other similar variations can rarely be given names. If this were done, their complexity, intermingling and variability would lead to a senseless array of meaningless names, of interest perhaps to the hoarding collector but of no true scientific value. The confusion possible were "varieties" all considered, may be readily illustrated by the forms of *Dichromorpha viridis;* in this insect macropterism and brachypterism are found and in color we have a wholly green and a wholly brown form, one with green sides and brown dorsum and one with the reverse, and both immaculate and speckled conditions. Naming only the more evident of such variations would not only oblige the use of quadrinomials, but eight names for only the major types of coloration, and in other species showing as many forms and developing a geographic race as well quinquenomials would be requisite. For conditions of really minor importance, such an array of names would be ridiculous.

Mendelian Factors.

Mendelian factors, which rarely occur in their pure form in nature, can not logically be used as a basis for specific or subspecific names; exemplifying, as they do, but a single tendency of the variational complex of the organism.

Our attitude is that the usefulness of taxonomic names in zoology is to designate what appear to be definite steps in the evolutionary development of the organisms under consideration. By definite steps we mean those stages which show a degree of completion and stability sufficient to distinguish them one from the other, excluding features of difference within themselves which are individual, sporadic or occasional or which represent merely some single manifestation of the complexity of the organism.

Additions to the Lists of Buprestidae and Cerambycidae of Pennsylvania (Coleop.).

By J. N. KNULL, Pennsylvania Bureau of Plant Industry.

Since the lists of Buprestidae and Cerambycidae of Pennsylvania have been published*, collecting records have made it necessary to add the following species which were not included therein:

POECILONOTA MONTANUS Chamb.—an adult female which agrees quite well with a specimen of this species determined by Mr. W. J. Chamberlin and now in the author's collection, was found ovipositing in a wound on a large toothed aspen (*Populus grandidentata*) in Clark's Valley, just north of Harrisburg, on July 31. The poplar had been partly girdled by a beaver.

ANOPLIUM PUMILUM Newn.—A specimen collected at Chambersburg, June 7, by the author.

PSEUDIBIDION PERTENUE Csy.—Specimens were collected at Philadelphia Neck, June 30 and July 18, by Mr. Charles Liebeck.

TYPOCERUS ACUTICAUDA Csy.—Presque Isle, June 9, E. M. Craighead; Mt. Holly, June 25, Hummelstown, July 11, Perdix, June 11, Inglenook, July 5, author.

Typocerus deceptus n. sp.

Form and color of *T. velutinus* Oliv., however the reddish brown area of elytra is quite dark in spots between the yellow maculations.

Antennae black, without impressed poriferous areas in the female, but these areas are marked in the male from the 6th to 11th joints inclusive.

Thorax convex, constricted anteriorly, sides sinuate, surface coarsely punctured, each puncture bearing a stiff recumbent golden hair.

Elytra cuneiform, sides sinuate back of middle, apices obliquely emarginate, surface finely densely punctured, each puncture bearing a recumbent hair, color of pubescence varying from golden to nearly black with the ground color of the elytra.

---

*KNULL, J. N.—"Annotated List of Buprestidae of Pennsylvania." Can. Ent. 54:79-86. 1922.

KNULL, J. N.—"The Buprestidae of Pennsylvania." Ohio State University Studies. 2, No. 2:1-71. 1925.

KIRK, H. B. and KNULL, J. N.—"Annotated List of the Cerambycidae of Pennsylvania." Can. Ent., 58:21-26. 1925.

Female with last dorsal segment nearly twice as long as wide, distinctly emarginate, surface coarsely and sparsely punctured, last ventral broadly rounded, slightly concave near tip.

Male with last dorsal emarginate, surface coarsely densely punctured near tip, last ventral broadly rounded, with concave area near tip. Length 14 mm., width 4.5 mm.

Described from a small series of both sexes all but one of which were collected by the author in Clark's Valley, north of Harrisburg during July and August, on the flowers of the smooth sumac (*Rhus glabra*). One other specimen labeled Mt. Holly, June 25, also collected by the author. The species was extremely rare as compared with the very common *T. velutinus* which could be found on practically every cluster of flowers in the same locality. *Type* female and *paratypes* in author's collection.

The new species superficially resembles a dark colored specimen of *T. velutinus* and undoubtedly stands under this label in some collections. It can, however, be separated on the markings, when one gets a series of both species together. Aside from this it differs from *T. velutinus* by being more robust, the elytra more acuminate and more sinuate back of middle. The thorax is larger in proportion to the width which makes it less robust than in *T. velutinus,* antennae of female without evident impressed poriferous areas, pygidium in the female being more elongate and more coarsely and sparsely punctured. In the systematic arrangement it should come next to *T. velutinus.*

Anoplodera minnesotana Csy. — Hummelstown, May 15, July 4, Inglenook, June 21, Perry Co., July 11, Clark's Valley, July 20, author.

Apparatus for Making Insect Locality Labels.*

By B. B. Fulton, North Carolina State College.

By means of the apparatus described below an entomologist can prepare a hundred or more clearly legible photographic insect labels for any locality and date with about ten minutes of actual labor and can have them ready to use in a little over an

* Published with the approval of the Director of Research, N. C. State College, as paper No. 29 of the Journal series.

hour. One photographic operation, that of developing the finished print is all that is necessary. The preparation of locality labels is so simplified that material from various localities can be labeled and distributed as it comes in instead of saving it till the end of the summer and running the risk of mistakes.

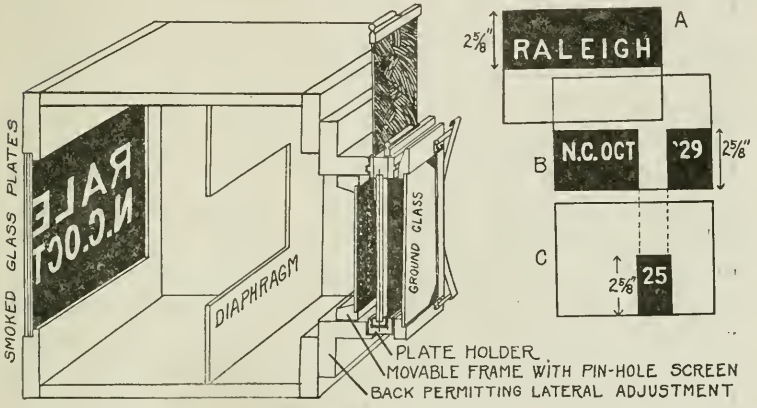
The apparatus is simple and can be made from old boxes by anyone having the rudiments of mechanical training. The essential parts are, (1) a light-tight box with a diaphragm near the middle, (2) a frame for holding three 5 x 7 glass plates (other sizes may be used if desired), (3) an opaque screen containing regularly spaced holes of small diameter, (4) a back for holding an ordinary plate holder. Each pin-hole in the screen acts as a miniature camera and makes a duplicate in black letters of the label which is scratched on a smoked glass. The printing is done directly on photographic paper held in the plate holder in a film-sheath.

Altho a view camera could be adapted to the purpose here described, a rigid box has the advantage of being always ready for use once it has been adjusted for making labels of the desired size. In my own apparatus I used parts of an old view camera for the front and back and made a four-sided box to hold them together. Near the middle of the box which measures approximately 8"x8"x8", I inserted a cardboard diaphragm to cut off reflections from the sides. The whole interior was painted dead black.

The accompanying figure shows the apparatus as if cut longitudinally through the middle. The front consists of a removable frame for holding 5 x 7 plates. It is deep enough to hold three plates and has spring clips to hold them in place. The back is a special view camera back designed for making lantern slides. It holds a lantern slide size (3¼ x 4) plate holder in front of a ground glass focusing screen. The frame that holds the plate holder is deep enough from front to back to permit the pin-hole screen being inserted so as to stand about 13 mm. in front of the plane occupied by the photographic plate. This frame is clamped to another having a larger opening which in turn is fastened to the box. When the clamps are loosened the

back frame can be moved up and down or laterally, a feature valuable for lantern slide making but of no use in the present circumstances after the back has been once squared and centered.

Making the pin-hole screen is the most difficult and exacting part of the whole operation. At first I tried a blackened celluloid film and made the holes with a fine insect pin. This did fairly good work but the thickness of the film tended to cut down light



that had to pass through at an angle. I tried tin foil with about equally good results. This was thinner but the holes could not be made without leaving a small burr around the edges. I finally made a successful screen by making holes in the gelatin film of a lantern slide plate that had been exposed to light, developed deep black, and fixed. The holes must be of uniform size and for best results should be about .3 mm. in diameter. These are made in the following manner: Pull the head off a very fine steel insect pin, No. 0, or smaller. Force the pin through a small piece of wood about ⅛ inch thick and pull through until only the head end is imbedded in the wood. Bend the free end into the form of a crank handle and place the block down on a blackened plate and turn the handle. A few turns will cut a neat hole in the gelatine film which can be examined and measured under a microscope. It may be necessary to try several pins before one is found that will cut a neat

hole of the right size. The pin must fit tight in the wood so that it does not wobble when rotated. It should be inserted near one edge of the piece of wood and a line should be drawn from the pin to the edge as a guide in placing the holes. A piece of cardboard is then fastened down to the plate that is to be used for the pinhole screen and the edge of the card marked with 4 mm. spaces or whatever space is desired for the vertical width of the locality labels. The block of wood holding the pin is moved along the card and the pin rotated at each mark. When the row is completed the card is moved over to a new position, a distance corresponding to the desired horizontal width of the labels which in my own pin-hole screen is 9 mm. The rows should be kept parallel and square with the plate. I made 6 rows 9 mm. apart, each containing 18 holes 4 mm. apart. If letters three-quarters inch high are used in the label plate, a vertical spacing of 3.5 mm. would be sufficient. After the holes are completed the plate can be examined under a binocular microscope and small flaws corrected with the point of a pin.

The plate is then cut to the right size and fitted into a small wooden frame so that it can be moved forward and backward in front of the plate holder. The gelatin side should be toward the plate holder and the wide space between holes should correspond to the longer dimension of the label. I found that I could extend the line of the holes farther in a direction at right angles to the words in the label without interfering with the printing. Thus, rows of 20 or more labels can be made at right angles to the longer dimension of the label. In the other direction the length of the label itself tends to increase the angle at which the light from the first and last letters passes through the holes, and limits the number of holes in horizontal rows to about 6 or 7.

The size of the labels will depend on the placement of the pin-hole screen. In my own apparatus the distance from the pin-hole screen to the front is eighteen times the distance from the screen to the paper, causing an eighteen diameter reduction in size. The printed images of the label should nearly meet on all sides so that only one cut with the scissors is necessary in cutting them apart.

Before the apparatus is ready to use a lot of old 5 x 7 plates must be cleaned off with hot water. They are then smoked over a flame such as physiologists use for smoking their kymograph sheets. Gas passed through benzene and burned in a fish-tail burner makes a very good flame for this purpose. By using tin masks the plates are blacked in three ways as shown in the figure. There should be 31 prepared with the small black area and about 8 with the two black areas. The number to prepare of those which are half blackened will depend on how many places the collector expects to collect in during the coming season. The blackened areas should overlap slightly when the three kinds of plates are superimposed.

After smoking the plates, flow alcohol saturated with shellac over the smoked area by means of a pipette. After drying they can then stand ordinary handling but letters can still be easily scratched in the smoked surface with a chisel-shaped piece of wood 3 to 4 mm. wide. Prepare a lettering guide by cutting rectangular spaces in a 5 x 7 card. A letter height of three-fourths of an inch is about right. Letter the small black spaces from 1 to 31 for the days of the month. The plates with two black areas should have the state and month abbreviations scratched in the left hand space and the year in the right hand space. Most collectors do their collecting for any one year within the the same state and during a relatively few months so that ordinarily six or eight of these labels are sufficient and good for the whole year. Each year the year abbreviation can be smoked out and new numbers scratched in.

The plates which are half smoked are reserved for the name of the locality which can be scratched in when needed. By using a letter guide and making plain block capitals I found no difficulty in scratching in any name in two or three minutes. By simply adding the plates for the proper month and day of month a complete label is made up and placed in the front of the box so that it reads correctly from the front. The box is then propped up on a window sill so as to point toward an area of clear sky not too close to the sun, and exposed for about thirty minutes. Be sure that the line from the highest pin hole to the bottom of the label points above the horizon. Use a

contrast paper placed in a film sheath and loaded like an ordinary plate. If several labels are needed at one time, several plate holders may be loaded and all exposures made before developing. The black slide in the plate holder is all that is needed for a shutter.

I gave my date and month plates a coat of varnish by flowing over them a little diluted balsam in xylol. This also clears the unsmoked areas that have been clouded with shellac. Most of the locality labels were simply cleaned up with a little alcohol on cotton and not varnished. All plates are kept between index cards in a card file. All locality plates are kept in the same way so that they may be used again if collections are again made in that locality. Since most collectors do much of their collecting around home or in a few interesting localities, a few plates will make labels for most of the insects collected and only a few new ones will need to be made each year.

By using a slightly wider space in the pin-hole screen this system could be used for making labels with three or even four lines so that the collector's name, or type of habitat could be included in the label.

Some Further Errors of Body Wall Nomenclature in Entomology.

By R. E. Snodgrass.

Probably the worst phase of any science is its terminology. The cultured mind cannot endure a bare fact. In order to have admission to intellectual circles, therefore, a fact must be properly clothed in a word or a phrase; in other words, it must have a name. But, once a fact is suitably costumed, we easily come to accept the dress for the thing itself. Hence, it readily follows that many imposters, which are mere ideas, though possibly at first honest ideas, acquire a good standing under cover of an agreeable adjective or noun.

The names of mere facts or of objects do not ordinarily create disorder; it is usually those terms that conceal an idea, or that connect a fact with an idea, that sooner or later lead to trouble, for there is sure to be a scandal eventually when it

is discovered that some particular idea has lost its credentials and can not longer be permitted to associate with respectable facts.

Words, with most of us, are expressions of thoughts; and yet we change or multiply our thoughts much more rapidly than we change our vocabulary. It seems that linguistically we have practised almost too much economy in making over these relics of our first wardrobe of respectable garments to fit our growing and diversifying family of ideas. As a consequence, we find that many words in our languages today express something quite different from that for which they originally stood. It has also occurred, in changing a verbal garment from time to time, that we have happened to get the thing on backward and have buttoned it up behind, or in front, as the case may be, and have then unconsciously reversed the idea in accord with the dress.

Many years ago, one hundred and six at the present writing, a Frenchman, named Odier, made a study of the chemical nature of the cuticular covering of insects, and he found that after the cuticula had been macerated in potassium hydroxide for some time a definite insoluble substance was always left. This substance he designated *la chitine,* explaining "c'est ainse que je nomme cet substance chiton, KITON, envelope". It would seem, therefore, that the chitin, as we translate the French into English, should be the softer, flexible substance of the cuticula, for the hard parts evidently are removed by the treatment with caustic. But now, if we turn to the definition of chitin as given in Webster's dictionary we read as follows: "A white amorphous horny substance forming the harder part of the outer integument of insects, crustaceans, and other invertebrates". Evidently our word chitin has somehow turned itself completely about during the course of a century, and has reversed our ideas associated with it, for Webster only reflects the common custom among entomologists of speaking of the hardened areas of the insect body wall as "chitinized", and the softer parts as "weakly chitinized", or "unchitinized".

There are some of us perhaps who have realized the error,

but have continued in it because the terms "chitinized" and "unchitinized" have been found very convenient in their current reversed application. Our tranquility has recently been disturbed. Messrs. Ferris and Chamberlin (1928) have called upon us to give an account of our laxness and our inconsistency, and, with Odier in the background, we can no longer evade a reform. Unlike most reformers, however, the writers just mentioned offer entirely acceptable substitutes for the misused terms they would displace, in that they propose the use of the words *sclerotic* and *sclerotized* instead of "chitinized". A sclerite thus becomes a sclerotized area of the cuticula, and not a "chitinized" or "strongly chitinized" area. The terms have been adopted by the writer, and are recommended for general use.

In a recent study of the chemistry of the body wall cuticula of insects, Dr. F. L. Campbell (1929), of the U. S. Bureau of Entomology, has shown that the entire cuticula contains chitin as its best known constituent, but that the hardened areas called sclerites can not be attributed to a condensation of the chitin, or to any change in its composition or texture. Other substances than chitin give rise to the sclerotization and pigmentation.

When the insect cuticula is heated in saturated solutions of sodium or potassium hydroxide, the hardening materials are dissolved, and the chitin is converted into *chitosan* and acetic acid, without change in appearance. Dr. Campbell, therefore, points out that the prevalent idea that chitin produces the hardness and inflexibility of insect exocuticula is no longer tenable. He shows that the so-called "heavily-chitinized", hard, pigmented exocuticula of the American cockroach contains about 22% of chitin, while the "non-chitinized", flexible, colorless endocuticula contains about 60%. In conclusion, he says: "The hardness of the exocuticula is caused by a chemical or physical change in certain substances intimately associated with chitin, which are present with it in the cuticula when the hardening process begins."

Having gone thus far in the matter of reform in the integumental terminology of entomology, we should rectify another

erreor of equal importance. The insect cuticula commonly shows in sections that it is composed of an outer layer and an inner layer, the outer one being usually the principal seat of those non-chitinous deposits that give color and hardness to the integument. The cuticular strata have been termed the "epidermis" and the "dermis", respectively. Consistent with this terminology the cell layer of the body wall beneath the so-called dermis is designated the "hypodermis". Since, however, the names "dermis" and "epidermis" are taken evidently from vertebrate anatomy, where all parts of the skin are of a cellular nature, they are clearly not applicable to the insect cuticula, which is a non-cellular product of the underlying layer of cells, and neither of its strata is a dermis in any sense. It then becomes quite illogical to call the formative cell layer a "hypodermis".

The cell layer of the insect or arthropod body wall is the external part of the ectoderm of the embryo. It strictly corresponds, therefore, with the epidermis of vertebrates, and its homologue is so named in all other groups of invertebrates. Many of the earlier entomologists did not use "hypodermis", and some recent writers have discarded it. In Schröder's Handbuch (1912) the ectodermal layer of the insect body wall is described as the epidermis, and Kűhnelt (1928), in discussing the structure of the insect integument, rejects "hypodermis" without ceremony. The term should no longer have a place in an entomological glossary, except as a disqualified synonym of *epidermis*.

The two layers of the insect cuticula are appropriately designated *exocuticula* and *entocuticula* by MacGillivray (1923), but *endocuticula* may be substituted for the second on the ground of euphony. Outside the exocuticula there is an extremely thin, non-chitinous surface layer, which is said to be of a lipoid nature (Kűhnelt, 1928*a*). The German histologist usually refer to this film as the "Grenzlamelle", a term appropriate when applied to sectional studies, but one that does not carry the idea of a continuous surface layer. The writer would, therefore, propose the term *epicuticula* for this outermost stratum of the arthropod integument.

One further point in nomenclature relative to the body wall must be considered. This has to do with the term "suture" as it is commonly used in entomology. The word suture comes from the Latin *suere,* to sew. In anatomy it properly applies, therefore, to the lines along which adjoining parts have united, as those between the centers of ossification in a vertebrate cranium. The so-called "sutures" of the insect skeleton are usually not of this nature. In most cases they are the external grooves of linear inflections of the cuticula that have formed internal ridges or plates to strengthen the skeleton, or to furnish increased surfaces for muscle attachments. In other cases they are lines where the hardening deposits of the cuticula have become secondarily discontinuous in order to give flexibility; or they are lines where the deposits have never been formed. In a few cases true sutures of fusion between originally distinct sclerites are present. Hence, under the term "suture" we commonly include at least four anatomically distinct structures. Since, however, an attempt to limit the use of the term would probably not be accepted at present, and, if it were, would leave us without substitutes for the three spurious cases, and besides would create confusion through differences of opinion, it will be well to leave rectification in this matter to some future reformer.

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Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The numbers **within brackets** [ ] refer to the journals, as numbered in the list of Periodicals and Serials published in the January and June numbers (or which may be secured from the publisher of Entomological News for 10c), in which the paper appeared. The number of, or annual **volume**, and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞*Note the change in the method of citing the bibliographical references, as explained above.*

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SPECIAL NOTICES.—Studies on the stoneflies of Japan by Masuzo Uéno. [Mem. Coll. Sci. Kyoto Imp. Univ.] 4, (B): 97-155, ill. [A monographic work.]

A Popular Guide to the Study of Insects. By E. Porter Felt, D. Sc. New York State Museum Handbook 6. Albany, 1929. 7½ x 5 inches (19 x 13 cm.), 147 pp., 62 figs. (For sale at the Museum, 50 cents.)—This is an excellent pamphlet to put into the hands of any one becoming interested in insects and who desires to know what to do first and how to do it. After a general sketch of the "Interesting and practical phases of insect life" (pp. 11-61) follow directions for making a collection of insects (61-78) and for preserving them (78-105). The principal orders of insects are briefly described (105-127) and the final section is entitled General Literature (127-140). This last tells of juvenile and popular books, textbooks, serials and the chief bibliographical aids to systematic, morphological,

economic and nomenclatural entomology. (Dr. Walther Horn's new *Index Litteraturae Entomologicae* might have been included.) But this is far from being the only guide to entomological literature. Many of the subsections into which the above mentioned topics are divided terminate with a list of books and papers relating to that special subject. The inquirer who wishes to know the qualifications of an entomologist, how to sugar, how to mail or ship insects, how to make microscopic mounts or to inflate insect larvae will find here answers to these and many other questions. Nor must we forget to mention the charming verses on insects and entomologists, from many authors, which are scattered throughout the volume. Finally, there is an index of 7 pages.—P. P. CALVERT.

THE PRINCIPLES OF FOREST ENTOMOLOGY, by SAMUEL ALEXANDER GRAHAM, pages I-XIV, 1-339, 149 text illustrations, McGraw-Hill Book Company, Inc., New York, 1929.

The title illustrates the scope of this work, since it is primarily concerned with the principles involved and is ecological instead of being devoted largely to detailed accounts of numerous species with discussions of control measures. The close limitations upon expenditures for control of various forest insects leaves no alternative course under present conditions, although experiences with large scale control work upon the gipsy moth in New England and minor though similar operations in relation to some other forest pests indicate that this limitation may not necessarily persist.

The student of forest entomology will find this work particularly valuable because of its discussion of the various factors which effect insect abundance, namely biotic potential, environmental resistance and the application of these facts in securing an indirect control of forest depredators. This last is exceedingly difficult owing to the large areas involved and the very close cost limitations imposed by the nature of the problem.

The chapter on leaf-eating insects summarizes in a most admirable manner the effect of such pests upon various trees and discusses the probable sequence of events following more or less complete defoliation.

The author naturally gives special attention to the more important forest insects in his discussion of general principles as well as in his accounts of various types of insect work. Throughout the volume, one may find numerous statements in relation to habits and behavior of many of these forms. There is a chapter on sap sucking insects dealing particularly with plant bugs, lace flies, the adelgids and various scale insects. There is a brief discussion of the insectivorous parasites and predators, including in the latter, a very brief summation in

relation to birds. There is an excellent classified bibliography and a detailed index. The numerous illustrations add very materially to the value of the work. The volume is marred somewhat by errors in orthography and evidently through an inadvertence, the author refers to the Chironomidae instead of to the Cecidomyiidae.

This work occupies a distinct field and cannot but prove most helpful and suggestive to all interested in various phases of forest entomology.—E. P. Felt.

OBITUARY.

Harrison Gray Dyar.

Born at New York City, February 14, 1866.

Educated at Roxbury Latin School (Massachusetts), the Massachusetts Institute of Technology, Columbia University and in the field.

Lived and collected several years at Rhinebeck, New York.

Collected and reared insects in New York, Colorado, British Columbia, Florida, Panama and elsewhere.

Worked at the United States National Museum from 1897 till his death.

Editor of the *Journal of the New York Entomological Society* 1904-1907, *Proceedings of the Entomological Society of Washington,* 1909-1912.

Proprietor and editor of *Insecutor Inscitiae Menstruus,* 1913-1927.

Worked on the Lepidoptera, especially their larvae, larvae of saw-flies, mosquitoes, especially their larvae, and bacteria.

Died January 21, 1929.

The world has produced many entomologists with a good eye for species—a number who have been able to comprehend the major groups of insects—several who have carefully and intensively studied the biology and early stages of one or another group. There have been hardly any who could do all these three things, and see a group of insects as a whole.

Dyar was one, and almost the only one of those who worked on the Lepidoptera who excelled in all three of these fields and was able to make a synthesis of them.

First: He was a student of the life histories of Lepidoptera. From his college days and for years after he reared caterpillars,

either independently or in collaboration with Miss Emily Morton, A. N. Caudell and others. The publications that have resulted, have included a larger number of full larval descriptions than the work of any other American entomologist,—perhaps more than all the rest together, if we leave out W. H. Edwards. His papers on the Eucleidae of New York in collaboration with Miss Morton[1] are a model that no one in this country (except Edwards, perhaps) has equalled.

Second: He was a systematic entomologist in the broadest sense of the term. On the basis of his knowledge of adults, eggs, and larvae—first stage and immature as well as mature—his work may perhaps be considered the basis of our modern classification of the moths. He was, I believe, the first to suggest from egg and larval characters the existence of a closely bound group surrounding the Noctuidae, and including the Notodontidae as well as the Arctiidae and their related families. Thoracic characters have since verified and strengthened this association. His work on larvæ, and especially first stage larvæ, has clarified our ideas on the classification of the micros, along lines first suggested by Herrich-Schäffer's work on the venation; and our recent further progress in the understanding of the micros has largely grown out of his work. In fact it is through the work of Dyar more than any one man that we can now say the classification of the Lepidoptera is probably the soundest and best understood of any of the large orders of insects. In the field of minor systematics—the synoptic classification of groups of species for convenient identification—his long series of papers are notable for combined clearness, condensation and convenience.

In biological theory his first paper laid down a rule that has since been referred to as "Dyar's law".[2] The preface to his doctor's thesis[3] contains a clear discussion of the nature of species and its relation to sexual and asexual reproduction which both entomologists and bacteriologists would do well to read. But most of his contribution to biological law has

[1] Journ. N. Y. Ent. Soc. iii-vii, with scattered papers later.

[2] The number of molts of lepidopterous larvæ. Psyche v, 420, 1890; Imms, Text Book of Entomology, p. 183.

[3] On certain bacteria from the air of New York City. Annals N. Y. Academy of Sciences viii, 322 ff., 1895.

been implicit. He understood how nature works, and was capable of applying his knowledge and of guiding others to its application.

As a curator he is largely responsible for the fact that the collection of Lepidoptera in the U. S. National Museum is probably the only large collection in the country where practically everything is named and arranged. Fortunately in this field he has found efficient successors.

As an editor he was always stimulating, and was more efficient than the average.

There is no one to take his place.

Wm. T. M. Forbes.

Dr. Dyar's work on Diptera began with the larvae of the mosquitoes nearly thirty years ago, when he was chiefly interested in early stages of Lepidoptera and sawflies. This was about the time when Dr. Howard had begun to make plans for a monograph of North American mosquitoes, and he asked Dr. Dyar to become a colleague in this enterprise. The monumental work "The Mosquitoes of North and Central America and the West Indies," was published by the Carnegie Institution in four large volumes, 1912-1917. Dr. Dyar did the taxonomic work, writing practically two volumes. Before it appeared he published with Mr. Knab an important paper on "Larvae of Culicidae classified as Independent Organisms."[4] He also published many shorter papers. He continued to publish actively on the mosquitoes after the monograph appeared. In 1921 he published "The Mosquitoes of Canada,"[5] and on account of the edition of the monograph being sold out, "The Mosquitoes of the United States."[6] He reviewed the nonbiting forms in "The North American Chaoborinae."[7] In the same period he began to take up other nematocerous Diptera, and published with R. C. Shannon a paper on the North American Simuliidae,[8] also several short papers on Psychodidae,

[4] Journal N. Y. Ent. Soc., vol. 14, 1906, pp. 169-230, with 13 plates.
[5] Transactions of the Royal Canadian Institute, vol. 13, part 1, pp. 71-120.
[6] Proceedings of the U. S. National Museum, Vol. 62, art. 1, 1922, pp. 1-119.
[7] Insecutor Inscitiae Menst., vol. 12, 1924, pp. 201-216.
[8] Proceedings U. S. National Museum, vol. 69, 1927, pp. 1-54, with 7 plates.

Thaumaleidae, and Dixidae. The last he considered a subfamily of Culicidae.

As considerable progress had been made in the study of South American mosquitoes, and the large monograph was no longer obtainable, the Carnegie Institution consented to publish a new volume covering all the known mosquitoes of both continents. This was Dyar's last large work, and appeared only a few months ago as "The Mosquitoes of the Americas," a volume of over 600 pages with 123 plates.

Even after this, although in frail health, he continued to publish, and only ten days before his death handed in a manuscript to the Museum giving an annotated list of the mosquitoes of Montana, with one new species.—J. M. ALDRICH.

A note in the *Journal of Mammalogy* for February, 1929, announces the death of Colonel WIRT ROBINSON, at Washington, D. C., on January 20, 1929, and refers briefly to his services in that department of zoology. His interests were much wider than that one field and included the insects. In the NEWS for January, 1903 (volume xiv, pages 17-21) is a paper of his authorship, entitled "A Trip After Papilio Homerus," extracted from a letter to Prof. E. J. Smith, Jr., describing the strenuous efforts made by him and his brother in Jamaica, resulting in the capture of 44 specimens of this rare butterfly. The visit to Venezuela made by him and Dr. M. W. Lyon, Jr., in 1900, referred to by the *Journal* quoted, yielded also a collection of insects now in the United States National Museum; the Odonata of this lot, with others, have been listed in the *Annals of the Carnegie Museum* for 1909 (volume vi, pp. 73-276). He was born in Buckingham County, Virginia, October 16, 1864, a region in which he collected in later years, sometimes accompanied by Mr. William T. Davis, of Staten Island. He graduated from the United States Military Academy in 1887, and entered the artillery service in that year as a second lieutenant, becoming a captain in 1898, major in 1907, lieutenant colonel and colonel in 1911. He was assistant professor of chemistry at the Academy, at West Point, New York, 1906-1911, and professor and head of the department since 1911.

P. P. CALVERT.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Argynnis of the world wanted by exchange for local Lepidoptera, or by purchase. S. P. Hayes, Jr., Amherst College, Amherst, Mass.

Wanted for cash, Catocala eggs: cara, vidua, obscura, residua, ultronia, retecta, praeclara, amatrix, unijuga, pura, insolabilis, lacrymosa, judith.—E. W. K. Schwarz, 40 W. 84th St., New York City.

Wanted—Lepidoptera, especially Lycaenidae and Hesperiidae, from all localities, in exchange for local Lepidoptera. Harold I. O'Byrne, 501 Pacific Ave., Webster Groves, Missouri.

Wanted—The Linnean Society of New South Wales, whose library is the only one in Australia recorded as receiving "Entomological News," is anxious to obtain a copy of the February, 1927, issue to complete its file. A. B. Walkom, Secretary, 16 College Street, Sydney, Australia.

Exchange—Will exchange California specimens for any of your locality. What have you to offer? Correspondence solicited. John Imschweiler, 748 N. Eucalyptus Ave., Inglewood, California.

Wanted—Blues, Coppers, Hairstreaks of all States, also Euchloe genutia. Norman R. Gunn, 1951 Yosemite Road, Berkeley, Calif.

Wanted—Specimens of Psammocharidae, particularly of the subfamily Pepsinae, from North America, Central America and West Indies. Will buy or borrow material for study.—K. A. Salman, Fernald Hall, Amherst, Mass.

Exchange—Pselaphidae and Scydmaenidae from all regions of earth, especially tropics, wanted for cash, exchange, or det: will give collectors going to tropics instructions for collecting them. F. C. Fletcher, 1766 James Ave. So., Minneapolis, Minn., U. S. A.

Exchange—South American, also Jave, Borneo, Celebes Butterflies in lots by 12, 50 or 100 monthly arrivals. Wish for revisional study all North American PARNASSIUS and ARCTIDAE, also APPATENSIS. Communicate with Mrs. Emma Kessler, 499 Manhattan Ave., New York City.

Wanted—Everes comyntas and amyntula from all parts of N. Am. by purchase or exchange for local lepid. Dr. Edwin P. Meiners, 6600 Delmar Blvd., St. Louis, Mo.

Wanted for Exchange or Determination, specimens of the genus **Eucerceris** of the Hymenoptera, tribe of Cercerini. H. A. Scullen, Department of Entomology, Oregon State Agricultural College, Corvallis, Oregon.

Mordellidae of the world wanted in exchange for North American species. Address Dr. F. J. Psota, 2434 South Crawford Avenue, Chicago, Illinois.

For Sale. Publications of the California Academy of Sciences: Memoirs, Vol. II, No. 1; Occasional Papers, Nos. 8, 10, 14–16; Proceedings, 2nd Ser., Vol. I, No. 1; 3rd Ser., Math.-Phys., Vol. I, Nos. 1–4; Botany, Vol. I, Nos. 4, 5; Vol. II, No. 7; Zoology, Vol. I. Nos. 1–3, 6–11; Vol. IV. Nos. 4–5; Geology, Vol. I, Nos. 1, 4; 4th Ser., Vols. 1–13. Original covers. Many entomological papers. Make offer.

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